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of the
NAVY MEDICAL DEPARTMENT

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Role of ABO Subgroups in Blood Transfusions

Twenty-five years ago, the necessity of adhering to the specific blood groups when transfusing whole blood was not fully understood. Too much reliance was placed on the crossmatch. It is true that if the crossmatch were compatible, the blood could probably be administered without encountering a transfusion reaction, but the possibility of sensitizing the recipient was not considered.

Today, basic concepts as to the requirements of blood administered to a patient have changed due primarily to two causes. First, there has been a marked increase in the quantity of blood administered to a patient during a single day. In the past, seldom was more than the equivalent of one unit of blood transfused to a patient in one day. Now, a recipient frequently receives six or more units in a 24-hour period. On one occasion at a Naval hospital, 23 units were transfused in 4 and 1/2 hours. Second, the question of repeated transfusions has played an important role in changing this past concept. Twenty-five years ago patients seldom had been previously transfused; today, many patients receive repeated transfusions at monthly or bimonthly intervals. As a consequence, not only the effects of one unit of blood, but rather the possible accumulative results of several units must be considered; further, the possibility of sensitization due to the subgroups in repeated transfusions must be borne in mind.

In the early 1930's, knowledge of the agglutinogens and agglutinins was limited. It was known that there were four major groups of the ABO factor and also the fact was known that a subgroup existed in group A; however, the significance of this subgroup was not well understood. Whenever a type A recipient was encountered whose blood cells were slow in agglutinating with the routine typing serum, quite frequently, the major crossmatch was incompatible. Therefore, four or five prospective donors were crossmatched with this patient, anticipating at least one satisfactory crossmatch.

Today, knowledge of the complexity of these agglutinogens and agglutinins is much greater, but still incomplete. Instead of one type of A agglutinogen, there is a complex of A agglutinogens. Similarly, a complex of agglutinins may be present.

Group A

Group A can be subdivided into two main subdivisions which are called A_1 and A_2; the subgroup A_1 has both A and A_1 agglutinogens; while the subgroup A_2 has A and A_2 or some other related agglutinogen. In the majority of instances, group A persons have anti-B agglutinins. In less than 1% of A_2 donors, naturally occurring anti-A_1 agglutinins are also present.

Most investigators maintain that there are distinct A_1 and A_2 agglutinogens, but others favor the theory that the difference is primarily one of cell sensitivity of the agglutinogens. Recently, an A_1 recipient who had anti-A_2 agglutinins was encountered, which gives additional impetus to the thesis that A_2 is a distinct agglutinogen.

In the not too distant future, it may be possible to subdivide further the subgroup A_1, because, while the majority of A_1 cells will be markedly agglutinated by anti-A_1 serums, slow weak agglutination occurs with a considerable number of A_1 blood specimens.

The subgroup A_1, comprising approximately 80% of group A, can be readily distinguished from the subgroup A_2 by the use of an anti-A_1 serum which is an absorbed B serum. Included in the subgroup A_2 are other subdivisions known as A_3, A_4, and A_0.

The A_3 subgroup has an agglutinogen A_3 in addition to the A agglutinogen. This subgroup is weakly agglutinated by natural anti-A agglutinins and strongly agglutinated by acquired or immune anti-A agglutinins. This difference in agglutinating ability with these two types of sera is more marked with A_3 cells than that which occurs with A_2 or A_1 Cells.

The A_4 is similar to the A_3 in that weak agglutination occurs with anti-A serum. However, the characteristic difference of the A_4 subgroup is present in the serum. In the serum of an A_4, an anti-A agglutinin is present which will produce agglutination of A_1 cells at 37° C., and strong agglutination of A_1 cells at 4° C. Furthermore, this serum will agglutinate A_2 cells at 20° C.

The subgroup A_0 is primarily characterized by the fact that most anti-A serums from group B donors will not agglutinate these cells, but the anti-A agglutinins in the serum of group O donors will readily agglutinate them. The A_0 donor may be mistyped as group O. Furthermore, if anti-A_1 agglutinins are present, a reverse type would appear to confirm his incorrect status as group O. If his blood should be used without a crossmatch, even with A and B substances added and administered to a group O or B recipient, a serious reaction could occur.

The A_4 or A_0 are similar in that the agglutinogen is not readily detected with B (anti-A) serum. The major distinction is found in the serum.

Group B

Subdivisions in group B have been reported. Because, to the best of the author's knowledge, a satisfactory subgroup B anti-serum has not been prepared, many workers hesitate to accept the probability of subgroups in group B. In 1948, several units of blood were administered to a group B recipient without encountering any difficulties in crossmatching or transfusing this patient. Approximately 6 months later, this recipient was again crossmatched and a marked incompatibility on the major side with approximately 50% of group B blood was found. Further studies revealed that this patient had acquired subgroup B agglutinins.

Recently, another group B recipient with a high titer (1:32) of subgroup B agglutinins was encountered.

Group AB

Any subdivision of A or B results in a similar subdivision of group AB. Furthermore, a large percentage of group A_2B has natural anti-A_1 agglutinins. For blood transfusions, the two subdivisions A_1B and A_2B are the only ones emphasized.

Sensitizations Due to the ABO Factor

1. The occurrence of natural subgroup agglutinins in the A_1 individual is not very common. The A_1 agglutinogen is the major of the so-called subgroup A agglutinogens. Therefore, it is believed that the A_1 individual cannot readily be sensitized to the other subgroup agglutinogens.

2. Less than 1% of A_2 persons have natural subgroup agglutinins. Because the A_2 agglutinogen is minor to the A_1 in antigenic properties, this group of persons should not receive A_1 blood because of the danger of sensitization, especially by repeated transfusions.

3. Because the other subgroups of A probably comprise less than 0.1% of group A, the chance of encountering one of these subgroups is not very great. However, the possibility of missing one, especially the A_0 as a donor, must be constantly remembered.

4. Although the possibility of sensitizing the B person by repeated blood transfusions is present, it is not possible to prevent this sensitization due to inability to successfully subgroup the B donors and recipients. However, when sensitization does occur, the selection of a satisfactory donor as indicated by obtaining a compatible crossmatch can prevent transfusion reactions.

5. Fortunately, the AB subgroups comprise only a small percentage of donors and patients. However, a significant number of A_2B persons (reported as high as 25%) has natural anti-A agglutinins. Furthermore, it appears that the A_2B is probably the most easily sensitized to the subgroup agglutinogens. Only a small additional number of tests is required to perform this subgrouping,

and the time required is much less than that used in setting up repeated cross-matches when incompatibilities are encountered due to subgroup sensitization. Furthermore, minor and even major transfusion reactions are prevented. Naval hospitals have been subgrouping donors and recipients since 1948 with most satisfactory results. (Captain John J. Engelfried, MSC USN, Role of ABO Subgroups in Blood Transfusions: Bulletin of the American Association of Blood Banks, 9: 283-287, September 1956)

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Pathogenesis of Cardiac Rupture

Cardiac rupture is an infrequent complication of myocardial infarction occurring in from 4 to 9% of cases of acute myocardial infarction in necropsy series. Factors considered important in its etiology have been heavy leukocytic infiltration in the area of infarction, involvement of the full thickness of the wall by infarction, fatty infiltration into the myocardium, absence of fibrosis, and persistence of hypertension or undue exertion by the patient during the acute postinfarction period.

The authors noted these conditions, occurring in many cases of myocardial infarction without rupture, and, therefore, question their etiological significance. Infiltrating intramural hemorrhage has been mentioned in the literature, but its importance has not been stressed.

There were 26 cases of myocardial infarction with cardiac rupture among the 6791 necropsies performed from 1942 to 1955, an incidence of 0.37%. The 26 cases comprised an incidence of 2.7% of the 970 cases of myocardial infarction autopsied at Milwaukee County Hospital during the same period.

Etiological factors which have been considerably emphasized are degree and extent of myocardial necrosis and the abundant exudation of neutrophilic granulocytes accompanying it. However, the histological findings in the present cases do not bear out the importance of these two factors. In 8 cases, myocardial degeneration was barely detectable. In 13 of 17, in which the pathway of rupture could be studied, the penetrating hemorrhage did not pass through necrotic myocardium, but infiltrated between muscle bundles and fibers. De-emphasizing the importance of extent of necrosis through the wall was the finding of only 15 of the 23 cases with necrosis of the full mural thickness. In another study, one of the authors examined 30 infarcted, but unruptured, hearts and found the degree and extent of necrosis to be greater than in this series of ruptured hearts. The finding of slight or moderate leukocytic infiltration near the site of rupture in 17 and considerable infiltration in only 5 cases makes the etiological importance of leukocytic infiltration improbable.

A factor which the authors considered of possible importance in cardiac rupture was thrombosis of Thebesian vessels which are known to be important

in myocardial blood supply, especially in regions of infarction caused by coronary arterial occlusion. It was thought that these vessels might cause necrosis of the narrow zone of myocardium supplied by them and, thereby, remove the few viable fibers remaining in the myocardial wall. This thesis was not borne out by results.

The pathological change in this series considered to be of major importance in mural rupture was the large hemorrhage within the wall in the vicinity of rupture. This hemorrhage appeared to have been a dissecting one, extending both transversely and longitudinally. In almost all cases, penetration was largely by infiltration between myocardial fibers and bundles, the chief pathways being loose connective tissue and fat. In only four cases, all showing advanced necrosis, did the blood pass directly through necrotic myocardial substance. Even in these, there was considerable interstitial infiltration. The source of the infiltrating hemorrhage could not be definitely determined; however, the finding of the largest collections of interstitial blood in the middle and outer thirds of the wall in 6 of the 16 cases suggests that in these, at least, the hemorrhage began in the wall. It seems from these findings that the mechanism of rupture is somewhat similar to that which occurs in dissecting aneurysm of the aorta. The counterpart of medical necrosis in the latter condition is the myocardial infarction, both conditions resulting in loss of support and alterations of the wall of small vessels, leading to hemorrhage and the formation of a dissecting mass of blood propelled by the systemic blood pressure. However, unlike the wall of the aorta which offers rigid resistance to transverse dissection and allows dissection only in the longitudinal plane, the nonfibrotic cardiac wall permits transverse as well as longitudinal dissection within it. By such transverse dissection, the point of rupture would consist only of a mass of blood surrounded by the easily penetrable endocardium and pericardium.

None of the cases in this series received anticoagulant therapy. Nevertheless, it is conceivable that the greater tendency to intramural hemorrhage could account for the greater incidence of myocardial rupture reported in cases of myocardial infarction treated with anticoagulant.

One would have to seriously question whether dissecting intramural hemorrhage is the main cause of hemorrhage in all cases of myocardial infarction with rupture, for it has been stressed in so few of the reported cases. However, because the area of the dissecting hemorrhage in the present cases was frequently narrow, one could easily ignore or overlook its significance. Perhaps one important point in favor of its importance is that it is one of the few considered etiological factors which is rarely found in myocardial infarction without rupture. (Lunseth, J. H., Ruwaldt, M., Pathogenesis of Cardiac Rupture Due to Myocardial Infarction: Dis. Chest, XXX: 499-505, November 1956)

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Therapeutic Appraisal of Antiemetic Agents

The symptom complex of nausea and vomiting is second only to pain as a clinical manifestation of disease. Although usually mild and self-limited, it may occasionally provoke more distress than the causative disease. Unfortunately, there is now no compound that specifically and completely inhibits the vomiting mechanism. Recently, certain drugs have been developed to block emesis of various etiologies by depressing specific areas of the brain.

Subsequent clinical trials with these agents—showing them to be effective in some conditions and ineffective in others—have demonstrated the need for a study of the relative effectiveness of each. This report compares observations with other similar studies in an effort to assay the usefulness of the various antiemetic agents in the symptomatic treatment of vomiting.

The authors have summarized the current concepts of the emetic mechanism and have reviewed the pharmaco-dynamics pertinent to the blocking action of the common antiemetic agents. An attempt has been made to correlate the site of action of the antiemetic drug with the source of emetic stimuli. Comparisons of the clinical effectiveness of the various antiemetic agents in vomiting associated with drug therapy, infections, toxicoses, surgical anesthesia, pregnancy, and motion sickness are summarized in a table.

Thorazine appears to be the most useful agent in drug-induced vomiting and that associated with various toxicoses. However, Dramamine, Bonamine, and Marezine are probably more effective in suppressing the emesis resulting from opiate administration. Parenteral administration of antiemetic agents should usually be reserved for patients who are unable to tolerate oral medication; subsequent doses may often be given orally.

The prophylactic use of Dramamine and Benadryl offers more protection from postoperative vomiting than does Thorazine. The frequency and severity of side reactions preclude the use of Thorazine, except therapeutically, for control of vomiting in the postoperative period.

In treating the nausea and vomiting of pregnancy, Bonamine (with or without pyridoxine) appears to be most useful. At least 90% of the patients improve under this medication. Again, Thorazine should be reserved for those whose pernicious vomiting does not respond to other therapy.

For the prophylactic treatment of seasickness, where it may be necessary to continue medication for several days, Bonamine also seems to be the drug of choice, primarily because of the convenience of less frequent administration. For shorter sea voyages and for most air travel, prolonged duration of action is less important and scopolamine is the most effective prophylactic agent. Because the untoward effects of scopolamine increase with readministration, Bonamine, Phenergan, and Marezine are often used with better results. (Connor, P.K. Jr., Moyer, J.H., A Therapeutic Appraisal of Antiemetic Agents: GP, XIV, 125-139, November 1956)

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Philosophy of Partial Denture Design

Any consideration of the logical design of a partial denture necessitates that, first of all, the basic requirements of such a restoration must be established. The objectives to be attained in a partial denture prosthesis are support, stability, retention, function, and esthetics. The order of importance of these objectives may vary. Many may agree that function should be the primary consideration. Perhaps that is true and the other factors mentioned are secondary.

The partial loss of natural teeth impairs mastication requiring the digestive organs to be overworked. This may result in impaired digestion, systemic disturbances and general ill health. This then emphasizes the need for replacement of the partial loss of the natural teeth in order to restore function.

Any restoration, however great its ability to function during mastication, cannot do so effectively if the appliance induces discomfort. Thus, the design of the restoration should be such as to result in comfort to the teeth, their associated parts, and the mucosa at all times. The problem is to restore the function of the masticatory apparatus and to maintain it in comfort to the patient.

An accurate diagnosis arrived at from roentgenographs, articulated study casts, history, and digital and visual examination of the oral tissues is a prerequisite to adequate design. The diagnosis should be the basis for a complete plan for treatment. This includes judicious surgery, restoration of individual teeth, shaping of the occlusal plane, recontouring of abutment teeth as well as replacement of the teeth that are lost. The total plan, therefore, should be complete before any replacement of the lost teeth is attempted.

The spaces to be restored by denture teeth with resultant mechanical stability, function, occlusion, and comfort to the patient should be considered. These denture teeth are embedded in denture base material. Dental bases function in many different ways. They assist in carrying the masticatory load; they may also be designed to minimize lateral and rotary movements of the restoration. The denture bases should be designed to prevent food impaction, to provide physiologic stimulation to the underlying mucosa, and, in some instances, to afford indirect retention.

A few general rules for the design of denture bases are: (1) Large bases are generally safer. (2) To prevent food impactions and to be less noticeable to the patient's tongue, the margins of the denture bases should end in natural depressions on resilient tissue. (3) The free gum margins of adjacent teeth should not be approached closer than 1/16 of an inch in order to minimize impingement upon the gingivae. (4) In the choice of the material for dental bases, provision for refitting should be considered.

Esthetics are improved by the use of partial dentures which are retained by internal attachments. When external attachments are used, preparation of the mouth to permit the retainer to clasp the tooth toward the gingival margin not only improves the esthetics, but reduces leverage on the abutment tooth. Drifted and tipped teeth may be reduced and aligned to allow for a more pleasing appearance of the replaced teeth, and a better approximation of the applicance to the remaining teeth. Clasps in the anterior portion of the mouth are more esthetic when confined to the embrasure area adjacent to the restoration. There is less embarrassment on the part of the patient when anterior teeth are to be lost if the immediate insertion partial denture is used. (Perry, C., A Philosophy of Partial Denture Design: J. Pros. Dent., 6: 775-783, November 1956)

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Physical Aspects of Megavolt Electron Therapy

Directed streams of electrons with controllable energies in the 1- to 3 MEV range have been found uniquely suitable for the treatment of radiation-sensitive disease at the skin. This approach to superficial therapy has been under investigation by members of the staff of the Lahey Clinic in Boston and the Massachusetts Institute of Technology during the 4-year period commencing August 1951. The present article reports on the physical aspects of such megavolt electron therapy, including the techniques of electron irradiation of small and of extensive skin areas, the dose distribution below the skin, the reduction of accompanying whole-body x-irradiation, and the avoidance of possible accidental over-exposure.

The effective treatment of radiation-sensitive lesions of the skin presents a variety of often difficult physical requirements. In the simplest case, the lesion may involve a single localized region of moderate size and superficial depth. Control by ionizing energy requires the delivery of an adequate dose and, if the lesion is malignant, the inclusion of an ample margin of healthy peripheral tissue. Such lesions can usually be controlled by conventional low-voltage x-ray therapy or by radioactive plaque techniques. Only too commonly these lesions are adjacent to, or overlie, tissue structure whose tolerance for radiation is small.

On the other hand, many superficial lesions are extensive and involve in varying degree all or nearly all of the skin. This is true of certain stages of mycosis fungoides, inflammatory carcinoma, psoriasis, atopic dermatitis, and generalized exfoliative dermatitis. Such cases, except for palliation of the most troublesome areas, are often outside the capabilities of conventional x-ray therapy, and still further beyond the more limited scope of the external radioactive plaque. For such cases, the use of large fields of high-energy electrons may offer a uniquely effective method of treatment.

Analysis of the wide range of clinical manifestations of superficial disease has shown that most lesions can be effectively irradiated by electrons of constant, but controllable, energy directed at normal incidence into the skin surface. Such electron therapy offers the hitherto unattained possibility of both limiting the radiation dose to the actual depth of tissue requiring treatment and of reducing the reaction in the radiosensitive skin. Moreover, monoenergetic electron sources can be arranged to irradiate either localized areas or, substantially, the entire skin surface with short exposure times and with accurate control of the dosage. In most respects, monoenergetic and normally incident electrons appear to possess the optimum physical properties for the radiation treatment of lesions near the skin.

Much of the advantage of electrons for the therapy of superficial disease arises from the unusual subcutaneous maximum dose and from the absence of dosage beyond the electron range. Moreover, this localized dose can be adjusted to the depth of the lesion by controlling the voltage by which the electrons are accelerated.

The unique localization of electron doses to a tissue layer near the skin makes clinically feasible the irradiation of extensive areas—even the entire skin area—to adequate clinical dosage levels. It is likewise technically feasible to irradiate large skin areas uniformly and rapidly with megavolt electrons from certain machine sources.

The source of electrons used in this study was a constant-potential electrostatic generator of the Van de Graaff type insulated in compressed gas. The electron beam emerged into air from the evacuated acceleration tube through an aluminum window of 3 mil thickness.

In order to distribute a nearly uniform electron dose over large skin areas, the emerging beam was further scattered by an additional 15 mils of aluminum. This scattered electron beam was confined to an aluminum cone, the bottom of which was closed except for a slit 45 cm. long and 1 cm. wide. By passing the patient through the downward directed beam of electrons, any exposed skin could be treated. This was accomplished with the aid of a motorized table.

About 150 patients with superficial disease have been treated with megavolt electrons; 60 of the cases were mycosis fungoides, often involving the entire skin surface. In many of these, the capabilities of conventional therapy had been exhausted, yet the response to electron therapy was dramatic. In general, no lesion within 1 cm. of the skin has been encountered for which treatment with electrons has not been found to be technically feasible.

Careful observations are being made of the response of normal, abnormal, and malignant tissue to controlled doses of megavolt electrons and of the systemic and hemopoietic reaction to large field irradiation. These clinical studies are still in an early stage and only preliminary reports have thus far been made. (Wright, K.A., Granke, R.C., Trump, J.G., Physical Aspects of Megavolt Electron Therapy: Radiology, 67: 553-559, October 1956)

Roentgen Therapy of Plantar Warts

Verruca plantaris, also called papilloma of the sole, generally forms at points of pressure on the ball of the foot. It may, however, be scattered over the sole, regardless of pressure. Sometimes plantar warts are grouped or several contiguous warts fuse so that they appear as one until the keratotic surface is shaved off. They seem to spread from the mother wart. The cores are soft and pulpy and are surrounded by a firm horny ring occuring in no other form of wart. Over the surface of the core may be seen multiple small black points. These are a result of hypertrophied papillae containing highly distended blood spaces largely filled by hematogenous hyalin. Plantar warts are frequently mistaken for callus. In any painful callus, careful search should be made for a spot that glistens in reflected light. On the weight bearing surfaces, the wart does not project above the skin as on the skin elsewhere.

The incidence of plantar warts has appeared to increase in recent years, possibly due to the increasing popularity of sports and the frequent use of public shower baths and locker rooms by a large number of people. This may also account for the increasing frequency in persons of high school and college age.

The symptoms of plantar warts vary from the sensation of a "pebble in the shoe" to marked disability. Treatment has often been delayed because of failure of the physician to recognize the condition or because of the indiscriminate use of such palliative measures as acids, frequent parings, and callus file.

The present treatment of plantar wart apparently does not lie within the field of any one medical specialty. It is a fact, however, that the gratifying results which follow the use of roentgen rays have led to general acceptance of this method which is painless in application and usually produces relatively little discomfort during the reaction stage. Pendergrass mentions that various caustics have been used with varying success, among which are listed salicylic acid, glacial acetic acid, trichloracetic acid, and chromic acid. Carbon dioxide snow and electrolysis have also yielded fair results.

In the clinic of the Duke University School of Medicine, during the past 25 years, irradiation has been the treatment of choice. The requirements of Osborne and Putnam are carefully observed. These are: first, the paring of the horny or thickened surface with a scalpel or a callus file; second, the close approximation of lead foil to the periphery of the wart; and third, immobilization of the foot during treatment. Persons over 50 years of age are not treated because of possible changes in skin nutrition. If the wart is under 8 mm. in diameter a single treatment is given using a dose of 1800 r with 100 kv., 1 mm. Al total filter and 4 inch (10 cm.) distance. The patient is asked to report for observation in 6 weeks. If warty tissue still remains, a 40% salicylic acid plaster is applied for 4 days and the area pared

down. Occasionally, this method fails and the wart is then treated with liquid oxygen or is surgically removed. At the time of therapy, the patient is told that he may have some reaction within 2 weeks following treatment and that approximately 4 weeks will lapse before the reaction subsides. The patient is also advised that should this treatment fail to produce a cure, the area is not to be irradiated again.

Of 80 patients in the present group, the authors were able to follow 58 persons for an average period of 84.3 months. Most of these patients (47) received only a single dose of radiation averaging 1700 r. Thirty-three patients were given fractional radiation treatments, averaging 2200 r within an 8-day interval. The majority of plantar warts occurred on the ball of the foot. The average follow-up period was 5 years.

Radiation therapy, if the proper requirements are followed, is the treatment of choice for plantar warts. The authors obtained the following results: Cured with disappearance of wart, 60 or 75%; cured with some callus formation, 12 or 14.8%; no effect or recurrence, 8 or 9.9%; postirradiation damage, 0 or 0%. (Reeves, R.J., Jackson, M.T., Roentgen Therapy of Plantar Warts: Am. J. Roentgenol., 76: 977-978, November 1956)

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Unexpected Death in Early Life

Fortunately, instances of sudden unexpected death occurring in previously healthy infants and children or in those with apparently only mild illnesses are uncommon in the experience of most physicians. When such tragedies do occur, every effort must be made to determine the exact cause of death. Not only must death from criminal causes be excluded, but also, whenever possible, the family must be made to understand that they were in no manner responsible for the death of their child.

An adequate explanation of such deaths can be obtained only by complete postmortem examination, clinical observations usually being too brief to warrant any conclusions. Both the clinician and the pathologist performing the necropsy should be cognizant of the types of lesions which may be responsible for sudden death in early life. Even their combined efforts may fail to demonstrate an adequate cause of death in a relatively small percentage of such infants and children. In the majority of instances, however, an adequate cause of death will be demonstrated by complete postmortem studies, including histologic, bacteriologic, and chemical studies, combined with clinical observations whenever these are available.

Unexpected or unanticipated deaths include: (1) those occurring after a brief and apparently mild illness; and (2) sudden deaths occurring in apparently healthy infants and children. Such an arbitrary division is not always a valid one, however, and is dependent in part upon the accuracy of clinical

observations in the period preceding death. This discussion is concerned primarily with the former group of patients, only 10 of the 103 patients dying suddenly and unexpectedly while in apparent good health. Septicemia was responsible for 6 of the 10 sudden deaths and for 10 of the 93 deaths during the course of a recognized illness.

An attempt has been made to include as causes of death only those lesions which might be accepted by the majority of pathologists and to abstain from attributing death to lesions of doubtful significance.

An adequate cause of death has been demonstrated in 85 of 103 infants and children who either were dead at the time of arrival in the hospital or died within 24 hours after admission; only 10 in the entire group can be considered as sudden unexpected deaths occurring in previously healthy infants. Infections were the leading cause of death, being responsible for 42 of the 103 deaths; minor infections such as otitis media or minimal pneumonic processes were not considered an adequate explanation of the death of an infant or child.

Congenital malformations, involving especially the heart, were responsible for 18 of the 103 deaths. In over one-half of these patients, the presence of a congenital malformation had been recognized for some time prior to death. Mild cellular infiltrates in the interalveolar septa were not included as a cause of death, nor was aspiration of gastric contents into the trachea. There was no evidence that any of the infants died as a result of suffocation.

The importance of obtaining postmortem cultures of the blood of infants who die suddenly and unexpectedly is emphasized and the significance of the presence of different types of microorganisms in postmortem cultures of the blood is discussed. It is suggested that the term "status thymicolymphaticus" might better be omitted from medical writings. (Arey, J. B., Sotos, J., Unexpected Death in Early Life: J. Pediat., 49: 523-538, November 1956)

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Management of Lingual Cancer

The tongue is the most frequently involved site of cancer arising in the oral cavity. Malignant tumors of the tongue cause more deaths each year than any other head and neck cancer including thyroid neoplasms. In the head and neck region, the incidence of lingual cancer is second only to cancer of the lip (excluding skin cancer). It has been estimated that cancer of the tongue accounts for 2 to 3% of all human cancer and approximately 1 to 2% of all fatalities resulting from malignant disease. Thus, in terms of prevalence, the management of tongue cancer presents an important problem.

This article is based on the experience gleaned from 102 consecutive cases of primary lingual cancer in patients admitted to the Head and Neck Service of the Ohio State University Hospital 1948 through 1955. This relatively small series has provided 136 separate operative procedures for the

purpose of cure or palliation. Furthermore, 35% of the consecutive radical neck dissections at this institution were performed for the control of cancer of the tongue.

Oral neoplastic disease occurs most frequently in the male and cancer of the tongue offers no exception. Seventy-four patients of the total 102 cases in this study were men. The predominance of males does, however, fall somewhat below that reported by other investigators. It is also a well established fact that cancer of the tongue usually affects persons in the fifth or sixth decade of life. In this series, the average age was 62.4 years with the oldest patient 93 years and the youngest 35 years. No appreciable age difference according to sex could be established.

The site of the lingual cancer was posterior to the circumvallate papillae in 47 patients, while the remaining 55 patients presented lesions anterior to this line. Of the latter group, in 45 persons, the cancer was on the lateral border of the middle third of the tongue, 7 patients had the anterior third of the tongue afflicted, and only 3 patients were found to have primary lesions located on the dorsum of the middle third of the tongue. Consequently, this series presents a predominance of basilar involvement with a lower prevalence of marginal lingual cancer. The average size of the primary lesion according to site was determined and it was found that lesions arising at the tip of the tongue averaged 2.1 cm., those located on the dorsum presented a mean measurement of 2.8 cm. with 3.6 cm. being the mean size for the lesions of the base.

The size, location, and type of primary neoplasm, as well as the extent of metastatic spread, dictate the therapeutic approach. Irradiation alone has been reported to control the oral lesion with fair results. The opinion of this clinic and elsewhere has been that cancer of the tongue is primarily a surgical problem. Each lingual site of origin is individually discussed.

Conclusions derived from this modest series of 102 patients are perhaps statistically contestable, but certain clinical findings are apparent. Cancer of the tongue might be considered as two different diseases depending upon whether it arises anterior or posterior to the circumvallate papillae. The anterior tongue cancers are nearly exclusively squamous cell carcinomas and are usually located on the lateral margin. The initial symptoms are invariably attributable to the growth itself, thus affording an early detection of the lesion. In spite of this, approximately one-fourth of these patients have palpable cervical nodes upon admission to the hospital. In this series, a majority of the female patients with squamous cell carcinoma had their tumors located anterior to the circumvallate papillae. By contrast, cancer of the posterior third of the tongue appears more frequently in the male and the predominance of squamous cell carcinoma is less marked. Symptoms are attributable to the direct extension of the primary tumor or to the metastatic spread. When eventually discovered, the primary lesions are usually large, and palpable cervical lymph nodes were evident on admission in 54% of the patients with cancer of the base of the tongue. The poor prognosis associated

with all cancers in this location is well recognized; but whether it is due primarily to a greater malignant potential of these tumors, the excessive delay accompanying the symptomless primary lesion, or the direct lymphatic spread into the deep cervical chain, is open to conjecture.

Syphilis appeared to be a significant predisposing factor only for squamous cell carcinoma arising on the anterior two-thirds of the tongue. The decreasing incidence of syphilis in the general population, and the increasing tobacco habit in women may account for two discrepancies of this survey as compared with other reported series. First, the men do not predominate greatly, particularly in the group of persons found to have cancer of the anterior two-thirds of the tongue. Second, there is a decreased incidence of the anterior two-thirds lesions as compared with other series. Thus, it seems that possibly oral hygiene and smoking rather than syphilis are playing a more decisive role in the predisposition for cancer of the tongue.

It is believed that the surgical treatment of lingual cancer is most uniformly successful. Without palpable evidence of lymphatic metastasis, the primary tongue tumor can be easily excised with little jeopardy of life or inconvenience to the patient. More extensive dissection is required in the presence of mandibular cervical or epiglottic involvement, or surgery may be coupled with interstitial implantation of radioactive iridium to obviate the need for occasional operative sacrifice of the common carotid or internal carotid arteries and to sterilize other sites of nonresectable tumor tissue. External radiation therapy has been employed chiefly as an adjunct to interstitial irradiation. (Berridge, F.E. Jr., James, A.G., The Management of Lingual Cancer: Surg. Gynec. & Obst., 103: 595-605, November 1956)

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Treatment of Short Esophageal Hernia

Sixteen patients with short esophageal hernia and esophagitis, but without stenosis, have been treated by Finney pyloroplasty. Fifteen of these patients are improved, ten are classified as excellent results, and five are classified as good.

Reflex esophagitis associated with true short esophageal hernia is a frequently encountered entity, and, in the authors' experience, has been the most difficult variety of esophagitis to manage. The subject of esophagitis has evoked a sizeable literature of which no review is attempted here. Suffice it to note that now the consensus that shortening, either congenital (rare) or acquired (common), of the esophagus is associated with elevation of a gastric pouch through the hiatus and with obliteration of the normal angle of entrance between esophagus and stomach. This gives rise to physiologic incompetence of the sphincter-like mechanism at the cardia and results in transcardial reflux of gastric acid-pepsin. The markedly corrosive effect of gastric juice

on the esophageal mucosa is amply attested to by clinical evidence and the classic experiments of Arroyave, Clatworthy, and Wangensteen.

Despite occasional optimistic reports in the gastro-enterological literature, there is considerable evidence from the surgical perspective that esophagitis associated with the short esophageal hernia is often a relentlessly progressive disease. The authors have frequently observed the inexorable sequence of worsening, beginning with mild inflammation, progressing to marginal ulceration and ending in stenosis while the patient was cooperatively following an expertly managed medical regimen.

Esophagitis—the commonest disease of the esophagus—is due to a variety of causes. It is important to carefully define the type of esophagitis and its cause before consideraing treatment. The type under discussion, viz., that associated with short esophageal hernia, is, in the authors' experience, the commonest type seen by the surgeon and has been the most recalcitrant variety to manage. Esophagitis from reflux associated with the ulcer diathesis or with gall bladder disease has uniformly responded to treatment directed at the ulcer or removal of the gall bladder. Those cases associated with the para-esophageal type of hiatal hernia have been simple problems requiring only the repair of the hernia to cure the esophagitis. Careful study and case selection is required if good results are to be obtained. As emphasized, the authors have done pyloroplasty only on those cases of short esophageal hernia where esophagitis was present, but where stenosis had not developed. Obviously, pyloroplasty would not be recommended for cases associated with gastric or duodenal ulcer. Two cases in this group did have gall stones, but the pathologic finding of the gall bladder was such that the authors felt certain in both instances that the gall stones were incidental findings. The importance of diagnostic care is emphasized by the one case in which a recurrent para-esophageal hernia with esophagitis was submitted to pyloroplasty. This case was not improved. When a correct diagnosis was established and the hernia repaired, the patient achieved a clinical cure.

To the authors, the concept of assuring downward outflow of gastric acid pepsin to prevent reflux by decreasing resistance at the pylorus is valid and is substantiated by the results of this series. This is too small a series and too short a follow-up to warrant sweeping conclusions. However, the results to date have been so strikingly good that they plan to utilize the procedure when indicated. Furthermore, the procedure is a simple one and, should it fail, it in no way interferes with other surgical approaches to the problem. (Burford, T. H., Lischer, C. E., Treatment of Short Esophageal Hernia with Esophagitis by Finney Pyloroplasty: Ann. Surg., 144: 647-651, October 1956)

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Chordotomy for the Pain of Gynecologic Malignancy

The problem of pain in the patient with unarrested or recurrent gynecologic carcinoma confronts both the gynecologist and the general practitioner all too frequently. This is especially true because the survival rate in female genital cancer is slowly rising. The authors present a brief survey of one neuro-surgical method, namely, chordotomy, for the management of such pain with their own experiences and conclusions as to its use.

The underlying principle of chordotomy is the interruption of pain and temperature fibers where they are gathered in the lateral spinothalamic tract in the anterolateral portion of the spinal cord. Pain fibers enter by the posterior root then cross over to the opposite side. They may travel up the cord as many as six segments before crossing over. To be certain there is absence of pain at any segmental level, therefore, the spinothalamic tract must be cut at least six segments higher. Touch sensation is maintained; too deep an incision may damage the pyramidal tract with subsequent paralysis of the legs. Bilateral chordotomy, separated by one segment, may be carried out as a one-stage procedure. Heavy sedation, local infiltration anesthesia, and intravenous Pentothal sodium are used. The level of resultant sensory loss to pin prick can be determined by testing the patient before closing the wound.

The prime indication for chordotomy is intractable pain, that is pain not relieved by ordinary analgesics and persistent in spite of the use of therapy for the condition causing the pain. The decision as to what constitutes severe pain for a sufficient length of time, as an indication for chordotomy, must, of course, be an arbitrary one. Pain of several weeks' duration may be enough. This period is excessive if, because of pain, the patient is losing appetite, is becoming more and more constipated from narcotic drugs, is mentally deranged from pain or is becoming an addict.

Chordotomy is not necessary and is in fact contraindicated when the pain subsides after the use of milder analgesics. If specific countermeasures to relieve obstruction of a viscus, or antibiotics to clear cellulitis are indicated, these should be administered before chordotomy is considered. Usually, life expectancy should not be less than 3 months because it may take half that time for recovery from a bilateral chordotomy done in two stages 7 to 10 days apart. Profuse bleeding is another contraindication. Drug addiction, so-called, unless firmly implanted in the psyche of the woman, is not a contraindication because so-called addiction often disappears when the pain is relieved.

Some important complications of chordotomy exist, even though the operation is a relatively simple one from the technical viewpoint. Immediately, postoperatively there are incisional pain, nausea, and vomiting, together with headache from pneumocephalus following the opening of the dura. Later, the most common complication is bladder dysfunction with urinary retention from loss of bladder sensation. Because gynecologic carcinoma is often complicated by urinary infection and bladder involvement by neoplasm, this may

be more troublesome than with other cases. This disability is usually temporary and the patient can easily be taught to empty the bladder by manual pressure over the lower abdomen until normal function returns in a few days. Persistent postural hypotension is a less common complication. Treatment consists of vasopressor drugs and abdominal and leg binders. The condition usually corrects itself. Brachial radiculitis, from irritation of the spinal nerves at the level of the incision, soon disappears. Arm and leg weakness is related to the skill of the surgeon; it is occasionally a permanent disability. Mortality from the operation itself averaged about 4% and can be minimized by proper selection of cases and by operating on the sicker patients in the prone position. In theory, pain should not recur if the operation is done properly, and if metastases do not extend above the level of analgesia. It is fortunate that malignancy of the female organs tends to stay below the level of the second thoracic vertebra.

In thirty-five cases of carcinoma of the female genital tract, four out of five patients experienced total relief of pain. These results seem to warrant consideration of the procedure in properly selected patients with a reasonable life expectancy. (Lang, W. R., et al., Chordotomy for the Pain of Gynecologic Malignancy: Am. J. Obst. & Gynec., 72: 1089-1093, November 1956)

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Pulmonary Infarcts and Pulmonary Carcinoma

The world-wide increase in lung cancer has brought about fervent research work in all civilized countries toward the elucidation of its causes. In the foreground of this research stands the study of inhaled carciongenic substances and dust injuries. Many regard cigarette smoking as the most important étiological factor. Although the importance of these causative factors cannot be stressed enough, there are still other etiological agents that have not been sufficiently considered. According to Maxwell, if the chief factor in the causation of lung carcinoma were cigarette smoking, a similar increase in carcinoma of the larynx would be expected because the larynx is exposed to the direct and most concentrated effect of inhaled substances.

In this study, the authors present an account of the relation between hemorrhagic infarcts of the lung and lung cancer. The fact that carcinoma of the lung may originate from scars has been recently recognized. Friedrich and Rössle introduced the concept of scar carcinoma of the lung. Friedrich discussed the question of what may be the origin of scars from which lung carcinoma may arise. According to his investigations, the size of the scars and the concentric arrangement of collagen fibers in them, as well as the antracotic pigmentation, prove the tuberculous origin of these scars. Friedrich stated that the genesis of lung carcinoma can be explained in a way similar to the origin of hepatocellular carcinoma in cirrhotic liver. According

to Lüders and Themel, scar cancers of the lung may originate not only from tuberculous scars, but also from scars of infarcts. These latter authors observed 24 cases of scar cancer of the lung of which 21 resulted from tuberculous scars and 3 from scars of infarcts.

The lung carcinoma starting in scars of infarcts is of importance not only from the point of view of lung cancer, but also from the standpoint of tumor genesis in general. It is known that the metabolism of tumors differs from that of normal tissues. The oxydative metabolism is suppressed and gives place to fermentation, i.e., breakdown of glucose into lactic acid. It has been proved that, in tumors, enzymes playing a role in the oxydative cycle weaken or disappear entirely. Knowledge of the genesis of tumors is still defective, but Warburg suggests that the anoxemia in the tissues plays an important role in the formation of tumors. Goldblatt and Cameron investigated the effect of lack of oxygen upon tissue cultures. Cultures of heart fibroblast from a 5-day old rat were exposed to intermittent anaerobiosis. After 2 and 1/2 years' cultivation, tumor cells were found that gave rise to transplantable fibrosarcoma after being inoculated into rats. v. Hayek showed that the form of cells lining alveoli varies considerably. In consequence of anoxemia the cells lose their projections and become round or cubical. Fischer emphasized the importance of regeneration in the development of tumors, and, according to Caspari, substances called "necrohormones," arising from necrotic tissues, are of importance in the causation of tumors. Fischer administered Granugenol, to which he added other irritating substances, to rabbits intravenously. He found that, as a consequence, infarcts developed in the lung. After the liquefaction of the infarcts, cysts were formed in which epithelial proliferation could be detected.

In the human lung, proliferation of alveolar epithelium frequently occurs on the border of hemorrhagic infarcts. Such epithelial proliferation may arise in several foci in the same infarct and can occur around several infarcts. The epithelial growth around infarcts derives from the proliferation of the alveolar epithelium. Stratified epithelium can also be formed from the alveolar epithelium through metaplasia.

Lung cancer can develop from the epithelial proliferation at the site of infarcts. This can be alveolar-cell carcinoma, but through metaplasia, squamous-cell carcinoma can also occur.

Epithelial proliferation occurring on the border of hemorrhagic infarcts of the lung cannot be the result of exogenous noxious agents, but is the result of the action of endogenous factors. Anoxemia, regeneration, and the effect of irritative substances liberated at the site of necrosis—necrohormones—are responsible for this epithelial proliferation. (Baló, J., Juhász, E., Temes, J., Pulmonary Infarcts and Pulmonary Carcinoma: Cancer, 9: 918-922, September - October 1956)

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Newer Agents in the Treatment of Leukemia

In this article, it is intended to summarize the status of the newer agents which are available for the treatment of leukemia. In discussing therapy, it is best to consider acute leukemia and the chronic leukemias as two separate groups because there are certain major differences in approach.

The agents available for the treatment of acute leukemia may be divided into two large classes. First, the steroid hormones of which cortisone, hydrocortisone, corticotropin (ACTH) and prednisone are examples. In this group, it appears that prednisone and prednisolone have certain advantages over cortisone because they produce less of the undesirable side effects on electrolyte balance for the same degree of therapeutic effect. The steroids act rapidly and are, therefore, of greatest value in the treatment of the severely ill patient with a hemorrhagic diathesis where rapidity of action is essential. They are particularly effective in children, less so in young adults, and least effective in adults over 30 years of age. The use of steroids in massive doses has been pioneered by Bernard in Paris, and Hill in this country. These workers believe that, with cortisone or prednisone in doses ranging from 1 to 5 gm. daily, remissions can be achieved in adults who would not ordinarily be expected to respond to more conventional doses of steroids. Even with prednisone, sodium retention, hypertension, and impaired carbohydrate metabolism occur at these dose levels, but this form of therapy appears to be definitely promising and requires further study.

The second group of useful agents may be classified as antimetabolites. This group may be subdivided into the folic acid antagonists, the purine antagonists, and the glutamine antagonists. The folic acid antagonists, of which the authors believe that amethopterin (Methotrexate) is the preferred compound, were first shown to be active against leukemia by Farber and coworkers. They are very useful in the treatment of the disease in children, but are much less effective in young adults and are rarely—except in special situations—useful in adults. The folic acid antagonists, as all the antimetabolites, act more slowly than the steroids and require 3 to 8 weeks to exert their beneficial effect. The remissions they produce, however, are usually considerably longer than with the steroids and somewhat longer than with mercaptopurine.

In a second subdivision among the antimetabolites with antileukemic effect are the purine antagonists. The active members of this group are mercaptopurine (Purinethol), Thioguanine (6-mercapto-2-amino-purine), and 6-chloropurine. With these agents also, 3 to 8 weeks of treatment is necessary before a beneficial effect is apparent. The remissions produced with them are slightly shorter than those with amethopterin, but longer than with the steroids.

A third group of the antimetabolites which is worthy of mention consists of the so-called glutamine antagonists, such as azaserine and DON (6-diazo-5-0x0-L-norleucine). These two compounds, derived from antibiotic

preparations, demonstrate considerable effects against animal tumors and leukemias, but have no practical value alone in human leukemia. Experimental studies in mice with Sarcoma 180 and in leukemic mice have shown definite synergistic effects with 6-mercaptopurine, however, and preliminary studies have suggested—particularly in children—that when used in combination with mercaptopurine they may delay for a short time the development of resistance to mercaptopurine.

With these three general classes of agents available for use, the question of which to use originally must be decided. The authors decisions are based on two facts: (1) That the steroids work rapidly, particularly in patients with a hemorrhagic diathesis, but that the remissions are of fairly short duration. (2) That the antimetabolites, on the other hand, take longer. to exert their beneficial effects, but that the remissions also last longer Therefore, the authors believe that the antimetabolites should be the main reliance of the chemotherapist and the backbone of long-range therapy. The steroids are extremely valuable agents and act so rapidly at a time when no other agent will work that they, therefore, should be saved for just such emergencies and should not be used in antimetabolite-suitable cases. Therefore, it is believed that the patients should be divided into two categories: (1) Those who are suitable for antimetabolite therapy. (2) Those who require steroids. Thus, in an acutely ill patient with a hemorrhagic diathesis, be it a child, young adult or older adult, steroids are suggested for initial therapy. For a child less acutely ill, the authors would use amethopterin, mercaptopurine, or the combination of mercaptopurine and Azaserine. For the young adult and for the older adult, mercaptopurine is the antimetabolite which should be used initially.

In the treatment of the chronic leukemias, there are five general groups of chemotherapeutic agents which can be used. In chronological order they are arsenic, urethan, the polyfunctional alkylating agents, the colchicine derivatives, and the purine antagonists. Since only newer agents in the treatment of leukemia are discussed, only two of the polyfunctional alkylating agents are considered. These are busulfan (Myleran (1, 4-dime-thanesulfonoxylbutane)) and CB 1348, or chlorambucil (p-(di-2-2chlorethyl) aminophenylbutyric acid). The original pharmacological reports suggested that busulfan had a specific effect on myeloid cells and not on lymphocytes. For that reason, its use in chronic granulocytic leukemia has been advocated. It appears that at the present time it is the best agent for use in this form of disease. Original studies did not appear to show any beneficial effect in chronic lymphocytic leukemia, but more recent studies have suggested that it may have some useful effect in this disease also.

CB 1348, or chlorambucil, another of the group of polyfunctional alkylating agents, appears particularly useful in the treatment of chronic lymphocytic leukemia and may be less effective than busulfan in the chronic granulocytic form. A colchicine derivative, desacetylmethyl-colchicine(Colcemid) which differs from colchicine by the removal of an acetyl group and substitution of

a methyl group on the amino nitrogen, was developed by Santavy and Reichstein and is reported to produce considerably less toxicity than colchicine for the same degree of antimitotic effect. This compound was first evaluated clinically by Moeschlin and co-workers and has since been studied by several other groups. It will achieve remissions in a high percentage of early cases of chronic granulocytic leukemia when given by mouth in doses of 3-10 mg. daily. Relapse occurs rapidly when therapy is discontinued, and, therefore, maintenance therapy is indicated at 3-5 mg. daily.

N-Desacetylthiocolchicine has been tried clinically by Huguenin and co-workers as well as by the authors. Although it appears to have a definite effect in reducing the leucocyte count in cases of chronic granulocytic leukemia, the responses have not as yet been regular enough to establish a dosage pattern.

In recent years, three of the purine antagonists have also been shown to produce remissions with a high degree of regularity in patients in the early stage of chronic granulocytic leukemia. Daily oral dosage of mercaptopurine or Thioguanine at 2.5 mg/kilogram or chloropurine at 15-20 mg/kilogram are all effective, but neither Thioguanine nor chloropurine seem to have any advantage over 6-mercaptopurine. Generally speaking, relapses occur rapidly when these drugs are discontinued and maintenance therapy must be given.

None of these compounds has been in use long enough for comparison with the more conventional x-ray therapy or radiophosphorus in respect to survival time, nor is it possible to compare one drug with another in this respect. Further studies will be required on all these compounds before any definite evaluation can be made, but it must be said at the present time that all these drugs can produce good remissions and have the advantage that they can be given by mouth and do not require the more expensive equipment which is needed for radiation of P^{32} therapy. (Burchenal, J. H., Krakoff, I. H., Newer Agents in the Treatment of Leukemia: Arch. Int. Med., 96: 567-572, November 1956)

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Detection of Coliform Organisms

The fact that it is impossible to determine the bacterial quality of drinking water at the time it is consumed is a cause of constant and major public health concern. With the increase in size and complexity of municipal water supply systems, the public health hazards and consequences of contamination have become ever greater. Should contamination be accidentally or deliberately introduced into a water system, routine bacteriological examination would not detect the dangerous condition until two or three days later. By that time, the water might have been distributed and consumed over a large portion of the community. For this reason, much attention has been

focused on the need for reducing the length of time required for bacteriological analyses. The method described in this article is an attempt to shorten the presumptive test for coliform organisms to one hour or less.

The delay in obtaining results by all conventional methods is due to a common cause, namely, that the criteria for the determination require direct visual evidence of colonies or gas production by the bacteria. Quantitative determination by the standard method test requires that a single coliform bacterium must give rise to a population of 1,700,000,000 cells before the accumulation of evolved gas is sufficient to produce a visible bubble. Similarly, the membrane filter test requires an incubation period of 20 hours to allow the development of visible colonies. Almost all the time required for either of these tests is spent in waiting for the tremendous amount of bacterial reproduction which must occur to produce the necessary visual evidence.

It is unlikely that any great increase in bacterial generation rates can be induced. Any significant reduction in time required for bacteriological analysis, therefore, must be achieved through the development of more sensitive means for detecting bacterial metabolism. The authors have been working toward this goal through the use of radioisotope techniques.

Radioisotope detection instruments are capable of sensing particles many trillions of times smaller than a bacterium. If bacteria would incorporate unstable atoms, radiation from the harvested cells or from their metabolic products would indicate the presence of the bacteria. Isotopes have been used to study metabolic pathways of various compounds and elements assimilated by large numbers of bacteria.

If selected isotopes in quantities sufficient for subsequent detection were assimilated by small numbers of bacteria, a rapid method for bacterial determination might result. For example, if coliform organisms would ferment lactose made radioactive by the substitution of a carbon atom with carbon-14, the carbon dioxide evolved by the cells should be radioactive. Calculations based on reported respiration rates of E. coli indicated that the method was feasible. Because the fermentation of lactose with the production of gas containing carbon dioxide is the standard method presumptive test for coliform organisms, the radioactive technique should, therefore, fulfill the requirements for that test.

In its present state of development, the radioisotope method can be relied upon for rapid qualitative presumptive determinations of gross coliform contamination. Positive results have been obtained from very small numbers of organisms after as little as 10 minutes of incubation and a total elapsed time of 25 minutes. However, there have been times when the determination for small numbers of cells has taken several hours. More research is needed in order to determine the reasons for, and to attempt to control, this biological vagary.

Variations in quantities of $C^{14}O_2$ produced per cell per hour pose a problem in quantitizing the test. If the rate of CO_2 evolved by coliform organisms can be made reasonably uniform, it will be possible to obtain a quantative

determination without resorting to testing numerous replicates of various dilutions as is required in the standard method test. A significant factor in the variability of CO_2 production rates may be incorporation or retention of the gas by cells reproducing or preparing to reproduce. The use of poisons to prevent the incorporation or retention is being investigated.

Since the project began, the amount of $1\text{-}C^{14}$ required per test has been reduced to the point where the radioisotope method can compete economically with the standard method. Radioactivity counting equipment required by the method represents an initial investment of approximately $1,000. The technique is simple and safe. Two important items, the Robinson gas-flow counter and the $1\text{-}C^{14}$ lactose, are not commercially available at the present time.

The possibility exists that the method can be made confirmatory for coliform organisms. Use of radioisotope techniques should also yield rapid determinations for other types of organisms by proper design of the best methods and media. In addition to water bacteriology, application of such methods should be practical in milk and food quality control and other public health work. It is also believed that a rapid method may be developed for total bacteria determinations. The latter would have important civil defense implications as a means for detecting bacteriological warfare. (Levin, G. V., et al. A Radioisotope Technic for the Rapid Detection of Coliform Organisms: Am. J. Pub. Health, 46: 1405-1414, November 1956)

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BuMed Instruction 6310.3

Ref: (a) Paragraph 7 of enclosure (1) to BuMed Inst. 6310.3

1. Addressees are reminded of the provision contained in reference (a) which requires that a NavMed-F card shall be submitted to the Bureau for each patient who is continued on the sick list from one calendar year to the next. Each patient shall be disposed of as "--" (Continued to Next Year) with the date of disposition shown as 31 December on the F-card. It is requested that this disposition (continued) card be submitted as promptly as possible after 31 December 1955. (StatDiv, BuMed)

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From the Note Book

1. At the Third Special Session of the Guam Legislature, held recently, the Medical Department Staff of the U.S. Naval Hospital, Guam, M.I., was commended for its extraordinary services in furnishing supplementary medical care and consultations to the people of Guam at their Memorial Hospital. (TIO, BuMed)

2. For outstanding contributions in preventive medicine while Officer-in-Charge, U.S. Navy Preventive Medicine Unit No. 6, Hawaii, Captain R.S. Poos MC USN RET received the Gorgas Medal Award at the 63rd Annual Meeting of the Association of Military Surgeons Convention. At the same convention the Founder Medal was awarded to Captain E.V. Jobe MC USN and Captain W.L. Jones MC USN. (TIO, BuMed)

3. The incidence of gynecologic lesions in Manson's schistosomiasis, although low, is of more than academic interest. In a number of cases, surgical treatment may be avoided if the condition is correctly diagnosed. Eighteen cases, tubes and ovaries 10, uterus 1, cervix 6, vulva 1 are described. (Am. J. Obst. & Gynec., V.M. Arean, M.D.)

4. In heart failure associated with chronic cor pulmonale, the best results are obtained from (1) use of antibiotics, (2) use of nebulized bronchodilators, (3) digitalization, (4) sodium restriction, (5) use of mercurial diuretics, (6) judicious reduction of the hypervolemia by phlebotomy. Artificial respiration may be life saving. (Dis. Chest, November 1956; A.M. Master, M.D.)

5. Excessive radiation doses in dental roentgeongraphic examinations are due principally to the relatively low kilovoltages and long time exposures employed. The usual short cone distance instead of a longer one, which also limits the beam, is also a principal factor in producing a high radiation dose. The techniques described indicate that by using higher kilovoltages, short time exposures, long cones, fastest films, and additional aluminum filters, the radiation dose can be reduced to a value presenting little or no hazard to patients and personnel. (J.A.D.A., September 1956; L.E. Etter, M.D.)

6. A method is outlined for the concentration of cancer cells suspended in large quantities of fluid. The method is rapid and efficient and appears to hold promise in the fields of pathology and cytology. (Cancer, September-October, 1956; S.H. Seal, M.D.)

7. This report presents data on the incidence of poliomyelitis infection in children by age in three population groups of differing economic, social, and ethnic makeup, together with the antibody response to Salk vaccine in the three different groups. (Am. J. Pub. Health, November 1956; L.L. Coriell, M.D., et al.)

8. The surgical management of carcinoma of the cervix is discussed in Surg. Gynec. & Obst., November 1956; J.W. Kelso, M.D.

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DENTAL SECTION

Administrators of Technicians Schools Hold Conference

On 5, 6, & 7 December 1956, a conference of administrators of Dental Technicians Schools was held at the U.S. Naval Dental Scnool, National Naval Medical Center, Bethesda, Md. The purpose of the conference was to evaluate the present dental technician training programs, to pool the knowledge of dental technician schools administration that has accumulated in the past year, to consider recommendations from field activities and, finally, to make recommendations to the Dental Division for improvement in the training programs. Administrators of the Dental Technicians Schools at Bethesda, Bainbridge, and San Diego participated in this conference along with designated Dental officers and Medical Service Corps officers of the Dental Division, Bureau of Medicine and Surgery and the Naval Dental School.

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Fitness for Promotion Through Correspondence Courses

BuMed Instruction 1416. 3 of 12 May 1956, sets forth a plan for the determination of professional fitness for promotion of inactive duty Reserve Dental officers by completion of specified correspondence courses.

Enclosure (2) of the above instruction listed the courses applicable to the Reserve Dental officer in the various grades. Except for certain exemptions, these courses were required before accepting promotions. Due to the incompleteness of distribution of this instruction in the various Naval Districts, numerous Reserve officers were taking unlisted noncreditable courses after 1 July 1956, the effective date of the instruction.

Because of the hardship entailed by noncreditation of these courses, the Bureau of Medicine and Surgery considered it essential that the effective date of the instruction be delayed one year. BuMed Instruction 1416. 3, Sup 1,

of 31 October 1956, changed the effective date of BuMed Instruction 1416.3 from 1 July 1956 to 1 July 1957.

It is anticipated that revised instructions regarding professi nal fitness for promotion will be issued in sufficient time that officers eligible for selection subsequent to 1 July 1957 may have ample opportunity to complete creditable courses.

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VA Fact Sheets Concerning Eligibility for Dental Treatment

The Veterans Administration Information Service has recently published fact sheets which set forth the requirements for eligibility of veterans to receive dental treatment. Because there are different eligibility requirements for World War I, World War II, Korean War, and peacetime veterans, and because the Veterans Administration makes the decisions regarding eligibility for dental treatment of veterans, it is important that dental officers of the Navy offer no advice to separatees regarding eligibility for dental treatment by the Veterans Administration. Attention is invited to BuMed Instruction 6620.2 of 20 March 1953.

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Navy Dental Officers Under Instruction

Dental officers of the Regular Navy under instruction as of 2 November 1956 are listed.

Intern Training	19
General Postgraduate Course	24
Residency Training	8
Advanced Training	10
Service Schools	2
Civilian Schools and Colleges	10
Total	73

Dental Officers on Active Duty 1809
Percentage of Dental Officers Receiving Training 4.03%

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Board Certified Dental Officers on Active Duty

Specialty	USN-Certified 1 Nov 1956	USNR-Certified Active Duty, 1 Nov 1956	Total-Certified 1 Nov 1956
Oral Surgery	14	0	14
Prosthodontics	27	0	27
Periodontics	2	0	2
O al Pathology	1	0	1
Pedodontics	1	0	1

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"Operation Build-Up" - Navy Dental Corps

On 6 November 1956, the Dental Corps, Regular Navy, reached another new peak with a total of 846 officers on active duty. This is an increase of 147 career dental officers since August 1954.

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MEDICAL RESERVE SECTION

Reserve Officers as Commandant's Representatives

Inactive Reserve Medical officers who are members of faculties or administrative staffs of premedical and medical schools may serve as commandant's representatives for purposes of recruiting students for the Reserve Medical Programs. These officers will function as local procurement representatives and will distribute publicity material and promulgate information pertaining to the Navy and Naval Reserve to interested individuals attending their respective colleges and universities.

Appropriate duty orders without pay will be issued and retirement points will be credited in accordance with BuPers Instructions 1300.18 and 1001.14.

The function of these individuals will be coordinated with the efforts of Offices of Naval Officer Procurement and Professors of Naval Science where appropriate. Officers in Charge of ONOP's will provide commandant's representatives with current information concerning recruiting and the Navy's most urgent needs within the respective programs.

Eligible officers for this liaison work are those Reservists who are in good standing and who are not serving in a pay status within the Naval Reserve Program.

Interested Reserve Medical Department officers should contact the Medical Reserve Program officer of their respective Naval District and request appropriate duty without pay orders in accordance with Recruiting Service Note No. 206-56, dated 10 August 1956.

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Publications Available to Inactive Reservists

All inactive Reserve Medical Department officer personnel are eligible to receive the U.S. Navy Medical News Letter. Considered to be an essential component of the training available for Medical Department Reservists, the Medical News Letter is published semi-monthly and contains articles of interest pertaining to the Navy's Medical Department as a whole. Of special interest to Reserve personnel is the Reserve Section which devotes its entire space to items of interest to all Naval Medical Department Reservists.

The Armed Forces Medical Journal, published monthly by the Armed Forces Medical Publication Agency of the Department of Defense, is devoted to the promulgation of information for personnel of the Medical Departments of the three military services. It is considered an excellent medium containing original investigations, observations, and clinical experiences of professional interest to all medical personnel of the Department of Defense. Inactive Reserve Medical and Medical Service Corps personnel may receive personal copies of this publication upon request.

The Medical Technicians Bulletin, published bi-monthly by the Armed Forces Medical Publication Agency of the Department of Defense, is a supplement to the Armed Forces Medical Journal. All Medical Department Reserve personnel, including enlisted personnel, are eligible to receive a personal copy of this Bulletin. This publication disseminates information of administrative and professional interest to all medical personnel of the Department of Defense. The aim of the Bulletin is to include in each issue original scientific and professional articles, editorial comments on current professional literature of special interest, clinical notes, and descriptions of new devices and instruments of particular interest to all noncommissioned medical personnel of the Department of Defense.

Eligible Reserve Medical Department personnel desiring to receive one or all of the above publications should address a request to the Chief, Bureau of Medicine and Surgery (Code 36). Individuals who are currently receiving the Medical News Letter are reminded that a renewal certificate is necessary yearly for retention on the distribution list.

Available Active Duty for Training

Fourteen days active duty for training in Insect and Rodent Prevention and Control is available at the Naval Preventive Medicine Unit No. 1, U.S. Naval Air Station, Jacksonville, Fla., beginning the first Wednesday of each month.

This course provides a series of comprehensive lectures, demonstrations, and field experience relating to vector and pest prevention and control procedures with special reference to Naval Preventive Medicine. The role of insects, other arthropods, and rodents in the disease-vector-reservoir host relationship is given careful consideration. Recognition, identification, biology, and habits of the vectors in relation to prevention and control are stressed. The types, procurement, toxicity, safe use, and proper choice and application of pesticides are dealt with. Recent advances and developments are brought out. Trainees are required to complete an individual project on some phase of insect and rodent control as assigned.

Eligible for this training are Naval Reserve male Medical Department personnel (including enlisted hospital corpsmen) and Reserve CEC officers. Quotas have been authorized for Naval Districts 1, 3, 4, 6, 8, 9 and CNARESTRA. Security clearance is not required.

On-the-Job Training in Submarine Medicine is available at the Naval Medical Research Laboratory, U.S. Naval Submarine Base, New London, Conn., for 14 days beginning the first Monday in February and May 1957.

Trainees will receive an up-to-date review of problems relating to Submarine Medicine and recent developments in Submarine Medicine Research.

Eligible are male Reserve Medical Department officers only. Quotas for the February 1957 course have been authorized for Naval Districts 6, 8, and 9; quotas for the May 1957 course have been authorized for Naval Districts 3, 4, and 5. Security clearance is required and clearance should be stated in orders issued.

Malariology and Insect Control is being offered at the Naval Air Station Alameda, Calif., on the first and third Wednesday of each month for a period of 14 days. This course offers an up-to-date review of insect and rodent control operations with information and techniques employed, including practical field experience.

Male Reserve Medical Department personnel (including enlisted) and Reserve CEC officers are eligible for this training. Quotas are authorized for the 11th, 12th, and 13th Naval Districts. No security clearance is required.

Reserve Research Seminar in Aviation Medicine will convene on 13 May 1957 at the Naval School of Aviation Medicine, Pensacola, Fla., for a period

of 14 days. This seminar will provide information concerning scientific and operational problems related to the biological factors in Naval Aviation.

Eligible are Reserve Medical Department officer personnel with priority being given to those members of the Reserve Research Program. Quotas have been authorized for all continental Naval Districts. Secret clearance is required and should be stated in orders issued. (Reference, BuPers Inst., 1571.4B)

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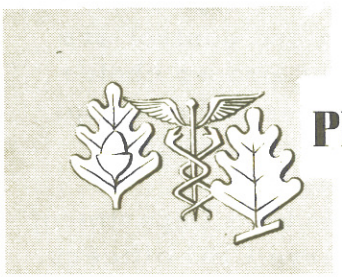

PREVENTIVE MEDICINE SECTION

The Manual of Naval Preventive Medicine - A Progress Report

Queries on the status of the Manual of Naval Preventive Medicine (NavMed P-5010) have prompted a further report on its progress. The binder and chapters 1, 2, 4, 7, and 10 of the Manual have been distributed. Chapters 3 and 5 are being printed and should be distributed at an early date. Chapters 6 and 8 are in the clearance stage and will be distributed early in 1957. Chapter 9 is being written and Chapter 11 is being assembled at this date.

Several chapter titles have been changed since the last progress report of the Manual was published in the 20 July 1956 issue of the Medical News Letter. The revised list of chapter titles is as follows:

Chapter 1 - Food Service Principles
Chapter 2 - Sanitation of Living Spaces and Related Services
Chapter 3 - Ventilation and Thermostress Ashore and Afloat
Chapter 4 - Swimming Pools and Bathing Places
Chapter 5 - Water Supply Ashore
Chapter 6 - Water Supply Afloat
Chapter 7 - Sewage Disposal
Chapter 8 - Refuse Disposal
Chapter 9 - Insect and Vector Control
Chapter 10-Insecticides and Dispersal Methods

Chapter 11 - Proper Handling of Navy Standard Pesticides
Chapter 12 - Preventive Medicine Laboratory Methods

The manual, Preventive Medicine Laboratory Methods, which was printed and distributed in 1953, is being revised and brought up to date in line with the 10th edition of Standard Methods for the Examination of Water, Sewage, and Industrial Wastes. This is being accomplished by the Preventive Medicine Division. The revision will be published as Chapter 12 of the Manual of Naval Preventive Medicine and should be distributed early in 1957.

It has been the desire of the Bureau of Medicine and Surgery to provide each medical officer, environmental sanitation officer, and environmental sanitation technician with an individual copy of NavMed P-5010. This has been accomplished in part.

Regulations effective 1 July 1956 prescribe that all requests for publications and forms be made through the Navy supply system. Charges will be made to the bureau or office exercising financial control over requesting activity (i. e., the Bureau of Ships for ships, et cetera). Medical officers have been affected most by this curtailment of distribution.

Those desiring copies of NavMed P-5010 may request them through their local supply system. Navy activities should use NavSandA form 43, and the Marine Corps activities should use NavMC form 10208 to requisition these as well as all other publications and forms. Inactive Reserve Medical officers should request the publication through the Reserve Medical Program officer on the staff of the District Medical Officer.

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Epidemic Salmonellosis Aboard Ship

A comprehensive epidemiologic report of an epidemic of febrile diarrheal disease has been received from a destroyer in the Atlantic Fleet. The apparent source of the epidemic, which involved over 30% of the ship's crew, was frozen chicken with probable contamination of cutting boards and utensils during preparation of the chicken and recontamination of the cooked chicken from these sources.

The Division Medical Officer with the assistance of the Preventive Medicine Unit No. 2 obtained the necessary cultures to confirm the cause of the outbreak as salmonella Newport, Group C-2. All cases were treated with terramycin and most of the patients recovered within 3 to 5 days. One man continued febrile beyond the seventh day, but recovered rapidly when chloromycetin was substituted. All other crew members were also treated with a prophylactic course of terramycin, but chloromycetin was necessary in one carrier.

In investigation of the possible causes of the outbreak, two major discrepancies in the handling of frozen foods were discovered which probably

played a major role. The first was the failure to make special provision for prompt delivery to the reefers of frozen foods during the loading of stores. In taking on large quantities of provisions needed for a 6-weeks cruise, a period of 8 hours was required for the loading and storage of frozen and perishable foods by a thirty-man working party. Evidences of partial thawing and refreezing were found in some chickens in the meat reefer. The second deficiency was the practice of removing frozen meats from the reefer and allowing them to thaw on the deck (temperature 100° F.) or in a copper overnight prior to preparing them for the noonday or evening meals. Both of these practices are conducive to bacterial multiplication, and in the present instance probably led to such a heavy growth of organisms that widespread contamination of the cooked meal occurred.

This outbreak led to a disruption of the ship's operations schedule. It again emphasizes the constant vigilance and training that are necessary to prevent such outbreaks and the ease with which they can occur when improper methods of food storage, preparation, and service are allowed to exist. Chapter 1 of the Manual of Naval Preventive Medicine (NavMed P-5010) and Volumes IV and VIII of the Bureau of Supplies and Accounts Manual contain detailed instructions pertinent to the proper methods of handling and defrosting frozen foods. These instructions should be rigidly observed.

One unusual aspect of the outbreak was the occurrence of a peculiar ankle involvement in nine men. In all but one the involvement was unilateral and consisted of pain, tenderness, redness, and slight swelling over the malleolar area. This appeared about a week after the initial cases of salmonellosis and the beginning of terramycin prophylaxis and involved mostly men who had not shown clinical symptoms of salmonellosis. The arthritis lasted for 3 or 4 days and disappeared. Conjecture was made as to its being some type of reaction to the antibiotic, but in the absence of similar reports from elsewhere this is considered unlikely.

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Critically Crushed Chests

Patients with severely crushed chests—if still alive on arrival in the hospital emergency room—should be salvaged if prompt treatment is instituted using the physiologic principles employed in thoracic surgery. The authors have effected the recovery of a number of patients of the sort heretofore considered hopelessly mangled.

A new method is presented here for the treatment of severe crushing injuries of the chest with the use of continuous hyperventilation by means of intermittent positive endotracheal insufflation to produce alkalotic apnea. The most striking benefit of this mechanical hyperventilation treatment is that it is safe and allows the survival of patients with seemingly hopeless prognosis.

Other benefits are: correction of paradoxical motion of the chest wall, removal of hypoxia and hypercarbia, absence of pulmonary edema, requirement for less sedation, no serious deviation in blood chemistry with prolonged respiratory alkalosis, no measurable circulatory defects, prompt return of blood chemistries and physiological responses to normal with cessation of hyperventilation, and no late ill effects.

Continuous mechanical ventilation should find a much wider range of application where there is loss of integrity of the chest wall (crushing injuries), trauma of the brain due to head injuries, and respiratory depression caused by industrial poisons. (Avery, E. E., Morch, E. T., Ph. D., Benson, D. W., Critically Crushed Chests: J. Thoracic Surg., 32: 291, September 1956)

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The Incidence and Management of Common Industrial Eye Injuries

In a study of 1107 reported industrial eye injuries, the injuries were classified. Suggestions for the treatment of these injuries are offered: An adequate history of the accident should be taken. The visual acuity of each eye should be recorded separately before any treatment is undertaken. No foreign body should be removed without proper illumination and adequate magnification. Adequate local anesthesia must be used. If cotton-tipped applicators are used, they must be sterile. Following the removal of a foreign body, an antibiotic ophthalmic ointment should be used and the eye should be padded. If the injury appears to be serious, first-aid treatment should not be attempted. Further damage should be prevented by covering the eyeball with a sterile pad and the patient should be referred to an eye specialist.

Atropine or homatropine should be used only by persons familiar with the eye conditions and with the complications that may arise from the use of these medications. In cases of chemicals splashing into the eye, the most important first-aid treatment is adequate irrigation of the eyeball. The patient should be asked whether he is sensitive to any drug. Suggestions for prophylaxis are also included. (Kaufmann, M. I. H., The Incidence and Management of Common Industrial Eye Injuries - A Survey of 1107 Cases, Canad. Med. Assn. J., 75: 284-287, August 15, 1956)

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Clinical Manifestations of Ozone Poisoning - Report of a New Source of Exposure

Three cases of ozone poisoning occurring in welders who used the inert-gas, consumable electrode type of welding are reported. The difficulty

in diagnosis is apparent in view of other clinical pulmonary conditions which resemble ozone poisoning. The diagnosis of ozone poisoning requires a high index of suspicion, an adequate occupational history, familiarity with the toxicological effects, and finding significant amounts of ozone in the working environment. Other poisons, such as nitrogen oxides and phosgene, were ruled out because they were found only in traces in the air. The presence of 9.2 ppm of ozone at the work site was far in excess of the presently accepted limit of 0.1 ppm. The following interesting features are stressed: (1) severity; (2) disparity between symptomatology and clinical findings—the marked dyspnea, chest pain, and cough were accompanied by only minimal findings in the chest; and (3) morbidity—the prolonged morbidity after complete clearance on chest roentgenogram was notable in two patients. This last feature has not been stressed to date. Because treatment is symptomatic, the main emphasis is on prevention and requires engineering control, including isolation of the process and provision of local exhaust ventilation. (Kleinfeld, M., Giel, C. P., Clinical Manifestations of Ozone Poisoning: Report of a New Source of Exposure: Am. J. Med. Sci., 231: 638-643, June 1956)

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Pulmonary Granulomatosis of Beryllium Workers - A Case Report

A fatal case of pulmonary granulomatosis due to beryllium is described. It was ultimately complicated by coincidental tuberculosis and secondary heart failure. The unusual behavior of this variant of beryllium intoxication is noted, including the lack of correlation among degrees of exposure and ultimate lesions, the long latent period, and the apparent "species specificity" of this condition. An explanatory hypothesis suggests that the lesion is the result of reaction between slowly formed antibody and gradually released antigenic beryllium; skin tests offer some confirmation. Striking similarity between these lesions and those of sarcoidosis exists; a diversity of etiological agents for the latter is suggested. (Sturtridge, J. W., Pulmonary Granulomatosis of Beryllium Workers Case Report: Canad. Med. Assn. J., 75: 288-291, August 15, 1956, author's summary)

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Radiation Protection - The Big Problem of the Atomic Age

At the beginning of the Government Atomic Energy Program, some experts believed that nuclear reactors would create so much powerful radiation that it would be impossible to protect the operators by any means. They were wrong, but their fears indicate the scope of the problems faced

in 1942. The many problems encountered and the various kinds of protection, safety planning, and monitoring used in atomic energy plants are described. These means of protection naturally involve considerable cost. Only a few companies will have to meet the problems associated with a power reactor. On the other hand, 1200 companies are using isotopes and many more will be using them in the near future. Some of the same hazards will be encountered in a small degree. Over an 11-year period, two people died of radiation injuries neither of which were caused by reactor operation. It is apparent from this record that hazard evaluation and preplanning can provide safe working conditions in atomic plants as well as in any other industrial plant. (Manly, C.G., Radiation Protection - The Big Problem of the Atomic Age: National Safety News, 74: 22-25, September 1956)

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Why They Wear Their Safety Goggles in Their Pockets

The most common reason for not wearing safety goggles is that they do not fit. A number of points to consider in fitting goggles are considered: not only adaptation to the face, but also adjustment of the focus for the eyes at the particular job; it may be necessary to wear bifocals or trifocals to adapt the vision to more than one working distance. For some work it may be desirable to have the near vision lens of bifocals at the top instead of the bottom.

The frame may interfere with peripheral vision. Heat-toughened glasses for protection from flying particles may be too heavy; lighter plastic lenses may solve the problem. The color or esthetic appearance of frames is a psychological factor. The examiner takes these factors and many others into consideration when he prescribes and fits safety glasses, but he needs the employee's cooperation. The ultimate responsibility rests on the employee in such matters as keeping the glasses clean and wearing them. (Beiling, H.G., Why They Wear Their Safety Goggles in Their Pockets: Safety Maint. and Prod., 112: 15-16, September 1956)

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Some Observations on the Morphology of Erythropoietic Cells in Human Lead Poisoning

Bone marrow changes were studied in nineteen cases of lead poisoning. The changes comprised a definite tendency toward increase of erythrocytogenesis. Basophilic stippling was the most conspicuous phenomenon. An increased incidence of plurinuclear erythroblasts was found. The nature and origin of these cells are discussed. The microscopic appearances of the cells at different stages are illustrated. The changes in erythroblasts

were reversible and of individual variable duration. These cell changes were associated with high blood lead values, increased coproporphyrinuria, and characteristic findings in the peripheral blood. (Beritic, T., Vandekar, M., Some Observations on the Morphology of Erythropoietic Cells in Human Lead Poisoning: Blood, 11: 114-122, February 1956)

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Change of Address

Please forward requests for change of address for the News Letter to: Commanding Officer, U.S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

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The printing of this publication has been approved by the Director of the Bureau of the Budget, 16 May 1955.

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